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Editorial.

Weights and Measures Bill. We have seen the text of the above Bill which Mr. P. V. Krishnayya Choudhari, M. L. C., proposes to introduce in the Legislative Council, Madras, and we heartily welcome the proposal, which should benefit primarily the cultivator and secondarily all those engaged in trade and commerce. The bewildering variety of weights and measures in use in the different districts and even in different villages of the same district affords great opportunities to the unscrupulous dealers for cheating the cultivator. There are laws prescribing the use of standard weights and measures by local governments but it must be said that the laws are hardly effective firstly because the public either do not know of their existence or take sufficient interest in it and secondly there is no proper system of inspection.

It is a common sight in several of the weekly *shandies* of the southern districts to see the ryots who resort to these *shandies* to get their food requirements carrying their own measures. They go about comparing prices quoted for their measures and decide to purchase where the rates are most favourable. When the ryot goes to the *shandy* to sell his produce, he often falls a victim to the unscrupulous middlemen who use their own weights and measures which are often manipulated. The cheap pocket spring balance which is often used by these people seldom registers the correct weights. It may be no exaggeration to say that the ryot loses about 10 to 15 per cent of the

legitimate price due to him by such manipulations. Though the officially sealed measure can be met with in the shandies there is no proper supervision to enforce that nothing else is used.

The seer is a common fluid measure in usuage throughout Madras but the capacity of the seer varies from anything like 33¼ fluid ounces to 69¼ ounces in the different districts. In the district of Malabar alone might be seen the whole range of the Presidency variation with regard to this seer. Similarly there is a big variation in the common units used in the buying and selling of grains. For instance the *kalam* which is a unit often used in the trade of paddy in southern districts is of 42 Madras Measures in North Arcot, 24 in Tanjore, 72 in Madura and 90 in Ramnad. The variations in the units were probably all-right in olden days when the dealings of towns and villages were self contained. With the introduction of railways and the development of roads and communications that exist now, not to say of the projected schemes of the radio broadcast of prices in the future reconstructed villages, the need for an all-India standard of weights and measures is an urgent necessity.

As has been stated in the statement of objects and reasons for the bill, the need for an uniform system of weights and measures for the whole of India was recognised as early as 60 years ago when the central Legislature in India passed a measure known as "the Indian weights and measures of capacity Act, 1871", which has been adopted only by the Government Departments and Railways. The units are the tola of 100 grains weight (One rupee weight) and multiples of the same leading to the Railway maund of 40 seers (82$\frac{2}{5}$lb.). But these have not been adopted on any widespread scale and action has yet to be taken to implement the intention of the enactment to "provide for the ultimate adoption of a uniform system of weights and measures throughout British India." The Government of India considered the whole question in consultation with the Provincial Governments in 1890--91 and came to the conclusion that legislation compulsorily applied over large areas subject to many diverse conditions of trade and social life would not bring out the desired reform so successfully as a "lead" supplied by local legislation based on practical experience. The whole problem was again brought under the special consideration of Government of India in 1913 when an influential committee was appointed to enquire into the subject anew. The committee reporting in 1915 was in favour of a uniform system of weights to be adopted in India based on the 180 grain tolas but considered that the introduction of the system involved considerable changes in the existing systems in several of the provinces. The Government of India approved the principles of the report but left it entirely to local governments to take such action as they think advisable to standardise dry and liquid measures of capacity in their provinces. As regards weights they decided in

favour of the standard of the tola and its multiples. They at the same time stated " if subsequently opinion develops strongly in favour of the Imperial standardisation of weights the Government of India will be prepared to undertake such legislation, but at the present they consider that any such step would be premature ".

In the light of Government of India's declaration it is a question left to each local Government to first standardise the weights and measures within its province but in so doing it must be remembered that any legislative changes introduced by one province must be such that they do not embarass an adjacent province or at some subsequent stage render an all-India legislation impracticable.

The Royal Commission on Agriculture which had also examined this question in 1928 recommended that the Government of India should undertake an investigation of the subject and lay down general principles to which provincial governments should adhere so far as this was possible without undue interference with local trade custom. Since the report of the Royal Commission action has been taken by Burma by passing a Bill providing standards of weights and measures. One striking feature of the Burma Bill is the power to recover from the villagers the cost of equipping village committees with standard weights and measures, by the imposition of a tax or cess on lands assessed to land revenue.

In Bombay a law has been passed in 1932 standardising weights and measures. The Government have however, decided that the act should come into force from 1st March 1935 and at the first instance to a few districts only. They have also made it clear that the introduction of the Act to particular districts is only preliminary to its extension over the whole of the Presidency after gaining experience in the working of the act. The consideration of a bill in the Madras Council has therefore come none too soon. The very fact that a non-official has taken the initiative is a positive proof that the popular opinion is in favour of such standardisation. There is no doubt that a uniform standard for the whole country will be welcomed by the traders and merchants also as it will help them to understand and watch the trend of prices of commodities, particularly those of more than provincial interest.

Recently the importance of marketing agricultural products has been recognised both by the imperial and provincial governments and there is now a definite marketing staff appointed in every province whose first duty will be to undertake surveys of all the agricultural products. It is in the undertaking of the surveys that the absence of any standardisation is most keenly realised.

It is the agriculturists who will gain the most by the introduction of standardised weights and measures and we feel confident that if the

objects of the bill are sufficiently explained to them there will be no objections coming from them for the standardisation. It has been suggested recently that the trade units adopted for cotton in Bombay, the chief exporting port of India, might be adopted uniformly all over India. In our province an enquiry was conducted by the officers of the Agricultural Department to find out whether the cotton ryots and cotton dealers were prepared to adopt the Bombay standard and it was an agreeable surprise to find that they were all in favour of it, so that the unit adopted now for cotton is a maund of 28 lb., a bale being equivalent to 28 such maunds (784 lb). We are sure that such a uniform standard can be adopted for every agricultural commodity. What is needed is only a systematic propaganda and the educating of the ryots to the new standards that might be introduced. Even when the act is passed it should take some considerable time to get the standardised units adopted everywhere. In an enlightened country like the United States of America an act was passed in 1913 establishing a National Bureau of Standards and it took this body nearly 23 years of hard work to establish a uniform standard of weights and measures throughout the state.

As regards the liquid measure, Mr. Choudhary recommends in his bill the adoption of the standard madras measure which is of the capacity of 62·5 fluid ounces with a diameter of 4·5 inches. Though this may not be universally used in the province, we should suggest the postponement of its rigid adoption because we find that it does not appear to bear any relation to the Imperial measures or measures adopted in any other province. In any all-India legislation that might be taken up later, the adoption of the uniform weights of tola and its multiples proposed in the bill will easily fit in but not the madras measure. Necessity may arise to alter it so that it will form a definite and convenient fraction of a bushel or gallon that may be adopted by the Imperial Government.

We whole-heartedly support the proposed bill we hope it will soon be passed into an Act as we are sure that this piece of legislation will confer immense benefit to the agriculturist in general and the small and illiterate ryots in particular.

NADAM COTTONS

By K. L. RAMAKRISHNA RAO, L.Ag.,
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Introduction. Nadam (G. *obtusifolium*) is a constituent of the group of cottons commercially called 'Salems'. One would infer from the name (nadam = country) that it might have been the cotton in general cultivation prior to the spread of annual cottons like *Uppam* and *Karunganni*. It is generally found in Coimbatore district mixed with an American type of cotton viz., 'Bourbon' (G. *Purpurascens*). Both the types are perennials and stand on the field for more than 4 to 5 years. Bourbon is named after the Isle of that name, where it is supposed to have been introduced by the French from the West Indies. It was first introduced in India during 1820 from Mauritius by Mr. Heath of Messrs. Fischer and Co.

Nadam is a tall shrub about 6 feet high branches arising at acute angles with the stem, with small leaves, yellow flowers, lint of short staple (6/8 to 7/8"), slightly adhering to the boll and strongly attached to the seeds. The ginning percentage is also as low as 23. Compared to this, Bourbon, is definitely better. Bourbon plants are about 3 feet high with large reddish leaves, creamy flowers, naked seeds and white lint definitely longer (nearly an inch) than Nadam separating readily from the bolls necessitating gathering immediately after bursting. This last character of this cotton is said to be one of the reasons for its falling out of favour with the ryots. Its ginning percentage (24—25%) is, however, a little better than that of Nadam.

The poor yield and quality of Nadam lint make it comparatively unimportant, the total area under it being about 37,000 acres. Further scope for its extension is very limited. The soil where it is grown is partly responsible for this. It is grown on red and gravelly soils of a very light and poor nature. These soils are generally classified as 'third class cotton soils' which are too gravelly and receive too little of rainfall to ripen any of the finer races of cotton on them. Cotton is mixed with cereals during the first year of its growth, while catch crops like horse gram are taken in favourable seasons during the second and third year of its life and ryots pay very little attention to the cotton crop. It is interesting to note here that these lands are very important to the ryots as grazing grounds for their cattle which are very important in the economics of the ryots in this tract. It also plays an important part in the house-hold economy of dry-land ryots. These cottons flush on receipt of every shower and facilitate the ryot to have weekly pickings and this quantity, though small, fetches them ready money for their sundry purchases at the weekly *shandies*.

Due to precarious seasons, the Nadam area has been gradually declining during the last 20 years. The Nadam cottons in general come up well only when there is uniform distribution of rainfall. Rains are necessary in summer (April-May) for proper preparatory cultivation, followed by good sowing rains in June-July (South West monsoon). A good precipitation is again essential in September-October (North East monsoon) for timely intercultivation. The average rainfall for the tract is 33·41 inches and if this is well distributed a good harvest is generally obtained.

It will be interesting to mention here in brief the cultivation of these cottons as is practised in Erode taluq of Coimbatore district. On recipt of good rains in *Chitrai—Vykasi* (May—June) preparatory cultivation is commenced by a good ploughing. A second ploughing follows with the receipt of another shower and sometimes even a third to get a good tilth. Manuring is also done occasionally. This consists usually of penning sheep, and occasionally penning cattle also and this is generally done just after the harvest of the previous crop in the month of *Thai* (December—January) the rate being about 1000 sheep per acre. This will be supplemented by 20-30 cartloads of village sweepings and also old earth round about the fences with decomposed leaves. In *Ani—Adi* (June-July) the cotton seed rubbed with lime or *vasambu** dust which are supposed to prevent attack of white ant and insects in the soils is broadcast mixed with *cumbu* (*P. typhoideum*). Generally 15 lb. of cotton and 10 lb. of cumbu seed form the mixture for sowing an acre. Two-thirds of the quantity is first sown and covered with a country plough, the balance is then broadcasted and covered by cross ploughing. The high seed rate used is due to the property of the soil setting hard immediately after the rains. Intercultivation is very simple. The first intercultivation is given in the form of ploughing 1 to 1½ ft. apart mainly for the cumbu crop, when the latter is one and a half months old. A second ploughing is given just after the harvest of the cumbu crop in October, which sometimes synchronises with the north-east monsoon. In good seasons when there is rain in December—January a third ploughing is given. The same number of intercultivations are given during the second and third years.

The growth of the cotton is very slow in the initial stages and flowering commences only in March—April and first pickings are taken after 11—12 months. The quantity picked during the first year is very little, the maximum being about 50 lb. only. The actual growth commences only in the second year and with favourable season and timely intercultivation a good harvest is obtained, about 200—250 lb. per acre. About 150—200 lb. is obtained during the 3rd year. But if continued further, the yield will decline rapidly. In certain

* *Acorus calamus.*

seasons especially during the second and third years, to accelerate branching, pruning is resorted to. It was an important operation during the early years of Nadam cotton cultivation, but it is now very rarely practised by the ryots. Pruning as was practised by Mr. Hughess in the cultivation of Bourbon cotton in India is worthy of notice. He says: "Pruning should be practised twice in the year. The first and most important pruning should take place between the 15th and 31st December, when the shrub is cut down to two feet high and two feet wide, only the firm wood being left with the strong white and brown bark. In January during fine days the plantation should be ploughed thoroughly three or four times. In less than two months the whole of the plants will be again in the finest foliage and full blossom and continue in full bearing throughout the months of March, April and May. Early in June a good many pods still remain and a second pruning should be practised of the long, straggling, twisted soft shoots with diminutive pods. Subsequently from July to September good produce may be obtained." Pruning experiments have been started in the Nadam Cotton Breeding Station at Perundurai and the results are expected to throw much light on the efficacy of pruning for these cottons.

From the observations so far recorded there is no serious disease or pest on these cottons. The only pests are yellow aphis and scale insects. Stem weevil is present, but casualities due to this insect are few. But the affected plants do immense harm indirectly. These cottons being in the field for more than three years, serve as a good breeding and harbouring place for insects, which readily attack other annuals when they are sown. Nadam cottons are the breeding ground for the stem weevil which is a dangerous pest to Cambodia. A pest act was introduced to eradicate serious cotton pests like cotton stem weevil and pink boll worm. The strict observance of this act has failed to control the pests in certain tracts, due to the presence of these cottons. This question has brought in the necessity for the improvement of Nadam, though its commercial importance is not great. Further if the objects of the pest act are to be achieved, the only alternative seems to be to evolve a suitable type of Nadam, which will give all its yield during the first year, or in other words to replace the present perennial Nadam cotton by an annual form. With this idea in view the Indian Central Cotton Committee has sanctioned the Madras Nadam Cotton Breeding Scheme for a period of five years and work on this scheme has been started early in June 1934.

The table below gives the economics of Nadam Cotton cultivation.

	Per acre. Rs. A. P.
(1) *Preparatory cultivation.* Two ploughings at Rs. 1—8—0.	3—0—0

		Per acre. Rs. A. P.
(2)	*Manure and Manuring.*	
	Sheep penning at 1000 sheep.	15—0—0
	20—30 cartloads of village sweepings and earth round the fences etc.	5—0—0
	Covering manure by ploughing.	1—8—0
(3)	*Seeds and sowing.*	
	Broadcasting 15 lb. of cotton seed and 10 lb. of cumbu and covering and ploughing twice.	3-12-0
	Cost of 15 lb. of cotton seed and 10 lb. of cumbu.	0-12—0
	Cost of horsegram (15 lb.) and sowing etc., during 2nd & 3rd years.	1—8—0
(4)	*Intercultivation.*	
	One ploughing with country plough both for cumbu and cotton 1—1½ ft. apart.	1—4—0
	Intercultivation of cotton alone 2 to 3 times a year i. e. after every rain.	3-12—0
	II year.	3-12—0
	III year.	3-12—0
(5)	*Harvesting.*	
	Harvesting cumbu and threshing.	3—0—0
	Picking cotton (paid in kind) for all the three years.	5—0—0
	Harvesting and threshing horse gram,	1—8—0
	Total...	52—8—0

Value of Produce.

(1)	Value of 480 lb. of cumbu at Rs. 7—0—0 per 162 lb. (one salagai).	17-12—0
(2)	Value of 300 lb. of horsegram for two years 2nd and 3rd years.	9-12—0
(3)	Value of 500 lb. of kappas at Rs. 1—8—0 per 21 lb.	35-12—0
	Total...	63—4—0
	Net profit for 3 years.	10-12—0

Acknowledgements. The writer is grateful to Mr. V. Ramanathan, Cotton Specialist, for giving him an opportunity to start the work in the Nadam Cotton Scheme and also for his suggestions in writing this small note.

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THE EFFECT OF SULPHUR ON BELLARY SHEEP

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It is well known that sulphur has a beneficial effect on the growth of wool. Considerable work has been done in Australia and elsewhere on the increased production of wool by the inclusion of sulphur in the ration. Bellary sheep on the Hosur Livestock Research Station, has a good conformation and is producing an average wool yield of 2·75 lb. The animals grow very slowly but they are capable of lambing twice a

year. The wool is clipped twice a year, but the quantity and quality cannot be compared with those of the Merinos. The object of the experiment was to see if administration of sulphur to the Bellary sheep would have any effect on the growth of wool.

Twelve rams and 12 ewes were selected for the experiment. Six of each sex were earmarked as experimentals and the rest as controls. Care was taken to see that all the animals in each sex were, as far as possible, uniform with regard to age, weight and wool-yielding capacity. The experimentals received 1/16 oz. of flowers of sulphur per head each day. The experiment lasted over 7 months and all the animals were weighed once a week. During the experiment the animals were under close observation and the administration of sulphur was withheld for short periods at intervals in order to obviate ill-effects. Two of the experimental rams died of enteritis, but it cannot be said that the death was due to the inclusion of sulphur in their ration.

Taking the two weights into consideration the experimental rams on an average put on 2 lb. more weight than the control and experimental ewes an average of 0·3 oz. more than the controls. It is evident that the experimental ewes did not respond to the ration as well, as the rams. The table below shows the effect of sulphur with regard to growth :—

Sex Group.	Aggregate weight of six on 23—2—31 lb.	Average weight of one on 23—2—31 lb.	Agregrate weight of six on 23—9—31 lb.	Average weight of one on 23—9—31 lb.	Average increase per animal lb.
Rams Sulphur	456	76·0	420*	105·0*	29·0a
Rams Controls	452	75·3	641	102 2	27·0
Ewes Sulphur	298	49·7	383	63·8	14 1
Ewes Controls	297	49·5	374	62·3	13·8

* Weight of 4 animals as 2 died.

a Increase of weight of only 4 animals.

The sheep were sheared at the commencement of the experiment and wool yield noted. Again, at the end of the experiment the weight of wool sheared was noted. From the table given below it will be seen that the wool yield of experimental rams do not show any improvement over the controls. Among the ewes however, the experimentals show on an average an increase of 1 1/6 oz. over the controls.

Sex Group.	Wool yield on 21—3—1931				Wool yield on 25—9—1931				Average increase of wool yield per animal.	
	For six animals.		Average per animal.		For six amimals.		Average per animal.			
	lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.
Rams Sulphur	9	9	1	9½	9	7*	2	3¼*	0	9¾
Rams Controls	10	0	1	10⅔	16	5	2	11½	1	0 5/6
Ewes Sulphur	5	10	0	15	9	4	1	8⅔	0	9⅔
Ewes Controls	5	3	0	13 5/6	8	6	1	6⅓	0	8½

* Wool yield of 4 animals as two died.

Conclusion. The experiment is interesting. So far as it goes, the small gain made either in the live-weight or wool yield, does not warrant the inclusion of sulphur in the ration for Bellary Sheep.

Acknowledgments. Assistant Farm Manager Mr. P. M. Appaswamy Pillai was in charge of the sheep and he was responsible for weighing and feeding.

THE INHERITANCE OF RED PERICARP COLOUR IN RICE (*ORYZA SATIVA*)

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and
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The red colour of rice is confined entirely to the pericarp and this is lost partially or completely when rice is subjected to various degrees of polishing, after husking. Independent segregation of red and white rice has been observed in cross progenies by several workers. Parnell (1917), Hector (1913), McKerral (1913), Thompstone (1915) and Van der Stock (1912) have all recorded a simple 3 : 1 ratio of red to white rice. Lien Fang Chao (1928) has however recorded as 15 : 1 ratio of red to white in addition to 3 : 1.

During the season of 1931—32 a cross was made between T. 322 having long panicle and white rice and T. 206 with short panicle and red rice, with the object of studying the correlation between panicle length and yield, and incidentally the rice colour was studied in the progenies. The F_1 generation was pure for red rice. The F_2 generation showed segregation for rice colour and the following results were obtained.

	Red rice.	*White rice.*	
F_2 ratio	545	41	
Expected on a 15 : 1 ratio	*549·3*	*36·7*	$\frac{\text{Dev.}}{\text{S. E.}} = 0{\cdot}7$

It is clear from the above that there are two factors involved for rice colour.

The F_2 population consisting of 516 plants was carried forward and grown as F_3 to confirm the F_2 behaviour. The examination of rice colour in the F_3 families was restricted to 40 plants taken at random in each family. From the counts so made, the families were grouped into different categories, and the different groups are given below.

Pure for red rice	209 families
Pure for white rice	30 ,,
Segregating families (15 : 1 and 3 : 1)	277 ,,

Of the two types of segregation 174 families gave

	Red rice.	*White rice.*	
	5923	398	
Expected on a 15 : 1 ratio	*5926*	*395*	$\frac{\text{Dev.}}{\text{S. E.}} = 0{\cdot}16.$
and 103 families gave	2969	956	
Expected on a 3 : 1 ratio	*29!4*	*981*	$\frac{\text{Dev.}}{\text{S. E.}} = 0{\cdot}93.$

Discussion. If R_1 and R_2 are the duplicate factors controlling rice colour, T. 206 will be $R_1R_1R_2R_2$ and T. 322 $r_1r_1r_2r_2$; the F_2 should give 15:1 ratio of red to white. Of the 15 reds in F_2, 7 will be pure red in F_3 due to the presence of both or either R_1 and R_2, 4 will give 15:1 ratio of red to white due to both R_1R_2 being heterozygous in them, and 4 will give 3:1 ratio of red to white due to only one of the factors R_1 or R_2 being heterozygous. The F_3 behaviour of 516 families based on the above assumption comes to:—

	Number of families actually obtained.	Number of families expected.
Pure for red rice	209	*226*
Pure for white rice	30	*32*
Segregating families on 15:1 and 3:1 ratios	277	*258*

($X^2 = 2{\cdot}8$ and P lies between ·30 and ·20)

Thus the F_3 behaviour confirms the F_2 results.

According to the chromosome theory the duplicate factors for red rice must be present in separate chromosomes and the occurrence of duplicate factors for the production of a particular character, may with certain reservations be taken as an indication of the polyploid nature of rice.

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ECONOMIC SURVEY OF A SOUTH INDIAN VILLAGE—PERUMANALLUR

By N. GANESAMURTHI, B. Sc. (Ag.)

Preliminary. Situated eight miles north of Tirupur on the crossing of the metalled roads from Tirupur to Kunathoor and Avanasi to Erode is Perumanallur, a Ryotwari village in the Palladam Taluk of the Coimbatore District. It consists of the hamlets of Pidarampalayam, Valasupalayam, Athikadu, Perumanallur and Purasupalayam. The nearest Railway Station is Kulipalayam, 4½ miles from the village reached by an *iteri*. The village is situated in the plains and there are no jungles or hills in the vicinity, but a small stream which is occasionally flooded for an hour or two in the rainy season runs close by. There are four small ponds (known as *Kuttais*) in the whole village each about 3 feet deep which is full only during the rainy season and the water seldom used for irrigation. The village appears to be a very ancient one.

Population. The population of the whole revenue village during the last four census is given in the following table :

Year.	No. of inhabited houses.	Population			Religion			Population per 100 acres of		Increase in % of women over men.
		Males	Females	Total.	Hindus	Muh's	Xians.	cultivated land.	occupied land.	
1901	277	631	685	1316	1309	7	—	67	65	8·5 %
1911	294	671	736	1407	1396	11	—	70	71	9·6 %
1921	329	792	813	1605	1558	—	47	79	81	2·7 %
1931	318	757	752	1509	1486	6	17	75	76	0 7 %

It may be observed from the above that there was a marked increase in population till 1921, but a marked decrease in the next decade. This is due to the emigration of the people to places like Tirupur and Coimbatore which are rapidly expanding as commercial cotton centres. Another reason is that almost all the Adi-dravidas have been converted to Christianity and they have emigrated to a settlement nearby.

The castes and the number of families in each are detailed below:–

Goundars	205	Oil Mongers	2
Mudaliars	31	Pandarams	4
Brahmins	9	Potters	4
Chetties	2	Masons	20
Barbers	3	Uppiliars	3
Washermen	3	Chukkiliars	18
Valian	4	Banglar	1
Toddy Tappers	14	Nair	1
		Adi-Dravida Christians	9
		Total...	333

The average number of men, women, and children in a few families is tabulated below.

Caste.	Average of No. of families examined.	Adults.		Children.	
		Male.	Female.	Male.	Female.
Mudaliar	13	2·1	2·6	1·3	·7
Brahmins	9	2·2	2·8	1 3	1·6
Goundars	10	2·0	1·7	1·2	0·2
Masons	6	2·3	4·1	2 1	1·8
Chakkili	6	2·1	3·5	1 0	1·7
Oil Mongers	2	2·0	1·0	0·5	0
Valians	2	2	3·5	2·5	1
Washermen	3	2·6	2·0	2·0	0·6
Adi Dravidas	9	0 9	1·1	0·1	0

Land. The area of land available for cultivation is 1864·4 acres and of this 621·97 acres are irrigated by wells. The rest are rainfed

dry-land. There are no wet-lands in the village. The following table gives the extent of occupied land in acres.

	'Fasli 1335'	'Fasli 1340
Occupied Government assessed land	1786·51	1788·41
Inam dry-land	70·16	70·16
Unoccupied Government assessed land	10·68	5·47
Total available for cultivation	1867·00	1664·00
Common Waste	20·57	20 97

There are no common pastures in the village. The number of wells (the only source of irrigation) and the area irrigated are as follows:—

Fasli year.	Number of wells.	Area irrigated in 1st crop.	Area irrigated in 2nd crop.
		acres.	acres.
1335	91	483·61	156·30
1339	94	534·48	292·74
1344	96	621·97	300·80

The number of wells and the area irrigated by them is gradually increasing and this indicates that intensive cultivation is being carried on.

The total land assessment of the village is Rs. 2044—7—0 and the classification of land according to assessment in the year of settlement is as follows:—

Pattas paying.	Extent in acres.	Assessment.
Re. 1/- and less	4·29	Rs. 5–13—0
Over 1 Re. and below Rs. 10	535·41	582–12—0
Rs. 10 to Rs. 30	589·11	708–10—0
Rs 30 to Rs. 50	262·55	298—9—0
Rs 50 to Rs. 100	117·13	145–15—0
Rs. 100 to Rs. 250	263·76	302–12—0
Over Rs. 250		
	1772·25	2044—7—0

Occupation of Land. Of the total area cultivated, 370 acres of garden land and 873 acres of dry-land are cultivated by land-owners and these are divided among 85 land-owners. 120 acres of garden-land and 195 acres of dry-land are sublet and cultivated by 16 tenants. There are 6 tenants who own no land. The rest, in addition to their small farm, take up additional land on lease.

There are 11 land-lords who cultivate a portion of their farm themselves and lease out the remaining lands. The period of tenure varies from one to three years and there are different systems of tenure.

Generally the rent is fixed in terms of money or in Cambodia cotton kapas. The tenant meets all the cultivation expenses and takes for himself all the produce except the kapas which he pays to the land-lord, the area under Cambodia cottons and other crops being previously fixed up. In the second system the land-lord takes his tenant as his working-partner; they share labour and other expenses equally, and the produce is divided equally, after the land-lord deducting a fixed amount of cotton kapas as the rent for the land.

A slight modification of this system is also in vogue. The land-lord contributes one or two pairs of work bullocks towards labour of the farm and the produce is divided in proportion to the land-lord's contribution after deducting the rent of the land in terms of cotton kapas.

The land assessment is always paid by the land owner.

There is a class of ryots called *Moopans* who combine agriculture with toddy tapping as a side industry. They take on contract coconut trees in the various holdings, for tapping at Rs. 5 per tree for 6 months. Trees are tapped only for 6 months in the year.

The total kist of the village is Rs. 2044—7—0.

The following statement exhibits the assessment on occupied land of the village for different soils.

The land assessment on occupied lands for fasli 1319 was Rs. 1863—7—0: by resettlement it has been Rs. 2044—7—0, an increase of Rs. 181—0—0.

Description of soil.	Rate per acre.	Area.	Assessment.
Best red loam	1-11—0	65—3	110—0—0
Good red loam	1—2—0	638-39	718-10—0
Best red sand	1—6—0	536-71	738—6—0
Good red sand	1 -2—0	68-72	77—8—0
Ordinary red sand	0-13—0	421-18	342—2—0
Best red sand	1—6—0	42-22	58—8—0
	Total...	1772-25	2044—7—0

Agriculture. The following table illustrates the area of the various crops in the village for five years.

Fasli year.	CEREALS				PULSES			Condiments.	Coconut.	Palmyra.	COTTONS				
	Paddy.	Ragi.	Cholam.	Total of all cereals.	Horse gram.	Dew gram.	Total of all pulses.				Karungani (Irri.)	Karungani (Dry).	Cambodia (Irri)	Cambodia (Dry).	Total Cotton.
1335	—	78·73	559·54	855·44	204 9	49·40	254·65	0·7	0·4	1·38	2·75	3·0	273 32	12·77	291·84
1338	0·10	9 ·56	501 31	806·41	335·93	156 5	494 18	0·76	0·4	1 76	–	7·90	362 66	37 20	407·76
1341	22·25	145·8	312 98	515·70	176 82	124·5	302 67	2·9	0 35	1 41	–	–	360 66	4·50	365·16
1343	50·35	129 4	389·42	636 87	225·76	261·60	494·7	0·58	0 49	2·4	–	–	397·11	2·00	399·11
1344	20·80	175 20	336·41	575·10	181·19	236 51	422·90	1·47	0·12	1 84	–	–	385 95	3 5	389 00

The important garden land crops raised are Ragi, Cholam and Cambodia cotton. A small percentage of the area is under garden-land paddy.

During the two monsoons, the village receives a rainfall of about 20 inches. Ragi nursery is raised during the last week of May. The seed rate is 3 madras measures per acre and the nursery seedlings are transplanted when they are about 25 days old in the prepared land ploughed 3 or 4 times. After one or two hoeings, the crop is irrigated once a week. The crop matures in about 3½ months. About 1800 lbs. of grain and 2600 lbs. of straw are obtained. Ragi receives heavy manuring. The usual rate is about 150 cart loads of earth and farm yard manure mixed roughly in the proportion of 3 : 1 and preserved for about 3 or 4 months. Village earth is carted during the off season.

Cambodia cotton follows ragi. There is no elaborate preparatory cultivation for there is no interval between the harvest of ragi and the sowing of cotton. Cambodia cotton seeds are sown broadcast at about 25 lbs per acre, covered with country plough, and subsequently beds are formed with *mamooty*. The land is irrigated once a week. About two hoeings are given in the first month. Picking of cotton begins in the first week of March and lasts till the middle of May. The acre yield of Cambodia cotton is 1000 lbs. of kapas.

The residual effect of the manure for ragi seems to last for cotton also. Hence no manure is applied for cotton. In very fertile lands a third crop is also raised.

Cholam is grown in the two seasons. Paddy is sometimes grown in the garden-lands. This checks the growth of weeds and increases the fertility of the soil as a lot of green leaves are applied to paddy.

Horse-gram and Dew-gram are sown in the dry-lands in the second week of October, and when they mature in the end of December, cattle are allowed to graze for about two months till the middle of February. Gingelly is raised as a second crop in the second week of May.

The economic unit of tenancy seems to be about 6 acres, of garden land with about 12 acres of dry-land attached to it. The former is commanded by a well fitted with 3 single mhotes and the farmer keeps 3 pairs of work bullocks, 1 cow, 1 buffallo and 2 calves. Of the 6 acres, 4 acres is occupied by ragi, (followed by Cambodia Cotton) and 2 acres by cholam. About 15 cents is set apart for vegetables, chillies and plantains. A dry land more or less equal in area is attached to each garden, in which is raised dry land crops. Fodder cholam crop is always sown in small areas for daily requirements of cattle.

The one and the only important implement used is the country plough. Because of its cheapness and simplicity, it is used for ploughing, covering seeds, forming beds and for many inter-cultural operations. There are two types of country ploughs,—the heavier,

weighing about 42 lbs. has a share 29″ long and 1″ broad. The beam measures 7′-6″ from centre of yoke. This type is used exclusively in garden land ploughing. The lighter ploughs used in dry lands, weigh about 26 lbs., with shares 15″ long and 1″ broad, the length of pole from centre of yoke being 5′-9″.

A garden land farm of 6 acres with about 10 acres dry land has the following implements:—

Dry land wooden ploughs		2 in use and 1 spare.
Garden land wooden ploughs		3 in use
Leather mhotes	...	3 & 1 (out of use.)
Mhote ropes	...	3
Tail ropes	...	4
Mamooties	...	4
Crow-bars	...	3

The single mhote is the only water-lifting contrivance. Three large holdings each about 30 acres are irrigated by pumps worked with oil engines of 13 H. P., 16 H. P. and 18 H. P. capacity.

The following table illustrates the number of work bullocks and other stock used in agriculture in the village for a series of years:—

Stock.		(Fasli Years.) 1334	1339	1342
Bullocks and bulls	...	417	391	396
Cows ...	...	181	186	213
Calves ...	...	160	184	248
She-buffaloes	...	37	39	60
He-buffaloes	...	...	2	...
Sheep ...	...	788	1131	1220
Goats ...	...	479	239	348
Carts ..	...	123	139	122
Ploughs (wooden)	...	199	171	263
Iron ploughs	...	...	...	8

During busy seasons especially during the sowings in October, ploughs and pairs of work-bullocks with men are hired for ploughing. The customary wage for the man, 1 pair of work-bullocks and the plough ranges from Re. 1 to Re. 1/8 per day. Double bullock carts are hired out, if labour of the work-bullocks can be spared, for carrying cotton kapas to ginning factories during April and May at Re. 1/8 to Tirupur.

There are no pastures in the village. In all cropping schemes sufficient area is sown with fodder for cattle. Besides the grain crops which yield straw for cattle, about 1/5 of the area of the garden is grown with fodder cholam, purely for work bullocks and cows. For about 9 months in the year, the cattle are stall-fed with concentrates such as cotton seed, rice bran, groundnut cake, and with bulky fodder such as cholam, ragi or paddy straw. The usual ration is about 3 lbs. of cotton seed, 2 lbs. of rice bran, 1 lb. of groundnut cake and about 20 lbs. of dry straw. The cattle are fed with concentrates in the noon. In November, December and January, the animals are allowed to graze in the dew-gram fields in dry lands. Stall feeding is not common in these months.

Nearly 90% of the cattle dung produced is utilised as manure. It is stored in a pit or heaped in a corner of the field and is mixed with village earth and sweepings roughly in the proportion of 3 : 1. Village earth is carted at odd times when there is no work in the farm. It is stored for about 3½ months and applied to the field at the rate of about 80 cartloads per acre. Ragi alone is manured and the residual effect lasts for the succeeding crops. Cattle urine is not preserved carefully. It mixes with the animal feed refuse, which is put in the manure pit.

The other source of animal manure is sheep-penning Sheep varying in number are owned by the ryot himself and they are penned in different portions of the field for various crops.

Green manures are rarely grown in the holding. Green leaves such as *margosa*, *Cassia auriculata* and *Calotropis gigantea* are collected from roadsides or from bunds and applied especially for paddy. The usual rate of application is about 600 lbs. per acre. Usually there are no serious pests of crops here. But this year there has been an attack of plant lice on cotton and departmental help was sought for combating it. The cotton stem-borer and the boll-worms were checked by the rigorous application of the Pest Act. There was an outbreak of Black Quarter among cattle and veterinary help was sought. The ryots are much impressed by the improved departmental strains of cotton seed.

The ryots do not breed their own cattle, but always buy them from the weekly markets of Perundurai, Avanashi, Tirupur and Kunnathur and in the annual cattle fair at Tirupur. Generally the Kangayam breed is preferred to others but the Alambadies are not uncommon. The price per pair of work bullocks is about Rs. 200. The animals are sold to *Chukklis* for slaughter when they grow old. They fetch about Rs. 10 per head.

Village. The area of the village site is 209 acres. The Brahmin quarters are situated in the centre of the village, surrounded on one side by Mudaliars and on the other side by Goundars and Masons. The depressed castes live far from the rest and in each hamlet there is a separate corner for them, known as *Chukkli* or *Para Valavu*. There are no terraced houses in the village and the houses are either roofed with country or Mangalore tiles or thatched with palmyra leaves. The dwellings of the depressed castes are all thatched, and there are about 100 such huts, most of which are now empty. 218 houses are tiled. Each garden has a dwelling where either the farmer or a permanent labourer lives. A farmer having 12 acres of garden land has it scattered in 3 places each 3 furlongs apart. Another ryot who has 60 acres has it divided in 4 places. This is more specially the case in dry-lands where a farmer having 70 acres has it divided in 8 places each several miles apart. There is no attempt at consolidating of holdings.

Next to agriculture, the other important industry of the place is weaving. This is followed only by the Mudaliars and once there were 40 looms in the village. But due to economic causes, the industry is deteriorating and at present only 4 looms are working. The weavers do not buy their yarn, but deposit Rs. 5 to yarn merchants and on this pledge, cotton yarn equal to this amount is given to them. This is woven and the cloth is taken by the yarn merchant and the wages for weaving are paid to the weavers. Cheap sarees alone are woven now and the condition of the craft is far from satisfactory. The wages of a weaver is six annas for every 8 yards of saree woven. Usually cotton yarn of forty or thirty counts is used. An adult member can weave in a working day of 10 hours one saree 8 yards long and this fetches him 6 annas. Six such sarees are woven in a week, Saturday being a day of rest. The following table shows the members of a weaver's family and the income and expenses of an average family:—

	adults.	children.
Number of members in the family	6	4
Number of adults who weave—males	2	
Number of women who help in weaving	3	

(Occasionally the women folk prepare and sell rice cakes)

Income.			Expenses.		
500 sarees woven in a year fetches a wage of	Rs.	190	Articles of food	Rs.	160
Miscellaneous income	Rs.	50	Clothing	Rs	40
			Interest on value of house	Rs.	10
			Interest on value of loom	Rs.	5
			Depreciation on loom		
			Ceremonial expenses		50
			Other expenses	Rs.	5
Total Rs.		240	Total Rs.		270

Recently a Ginning Factory has been started by three partners with a capital of about Rs. 9000/-. It provides labour for nearly 50 men and women coolies a day, their wages ranging from 2½ to 3 annas a day.

Economic Conditions of the Agriculturists. The following is the family budget of a land-lord having 10 acres of garden land and 12 acres of dry-land:

Income			Expenses		
Ragi	Rs.	200	Food	Rs.	300
Cholam	Rs.	200	Clothing	Rs.	100
Paddy	Rs.	150	Ceremonial functions as marriages, deaths, etc.	Rs.	200
Other grains ...	Rs.	50	Travelling ...	Rs.	100
Cambodia cotton ...	Rs.	1000	Barbers, dobies etc. paid in kind		25
			Expenditure in farming	Rs.	900
				Rs.	1425
			Interest on borrowed amount	Rs	200
Total Rs.		1600	Total	Rs.	1625

This gentleman has borrowed about Rs. 3000/- for the marriage of his son, to clear inherited encumbrances, for litigation and for the improvement of his land.

The budget of the weaver clearly indicates the condition of the craft. He is able to meet his expenses by borrowing from his village chit fund.

There are three kinds of agricultural labourers in the village. The permanent labourers attached to the farm who are mainly Goundars, Madharis or Chukkiliars doing such operations as stitching mhote buckets, sandals and helping in agricultural operations, and thirdly casual labourers the majority being women.

The permanent labourers are about 160 in number and they are paid in kind ranging from 8 to 26 *vallams* of grain according to their age and efficiency. They are paid in ragi or cholam.

The Madharis are advanced Rs. 10 free of interest when they join the farm, and given 8 *vallams* of cholam or ragi per month and a *mamool* of 8 *vallams* per *pothi* of crop produced. When they leave the the farm they must return the advance. Casual labour is engaged whenever necessary for weeding, hoeing, harvesting of paddy and ragi, picking cotton kapas. The majority of them are women. They are paid in kind about 1 vallam for the harvest of crops as paddy, ragi or cholam and for picking kapas they are paid 2½ annas per head. Men casual labourers get 4 annas. Permanent labourers join or quit the farm once in a year, viz., in the month of Thai (during Pongal). Besides the above, the farmer gets the help of the village artisans, who are given in kind a *mamool* of 8 *vallams* during the harvest of grain crops.

The staple food of the people is rice and ragi. The labourers always take ragi and rice is considered to be a luxury. The better class of people take rice.

The following is the average price of the various staple food grains.

Food	Retail price	Wholesale price
Paddy	4 vallams per rupee	Rs. 22/- per pothi of 96 vallams
Ragi	5½ vallams per rupee.	Rs. 18/- per pothi of 96 vallams

Within recent years, no family in the village has made any saving. This is due to slump in the market of agricultural commodities and the frequency of bad seasons. They have spent away their cash and have pledged their jewels. In times of prosperity, the savings are utilised in buying new lands. Industrial enterprise and banking habits have not been cultivated ; nor have they confidence in lending money for interest. Almost all the ryots are involved in debt. They borrow to clear their inherited encumbrance, to meet the cultivation expenses or for ceremonial functions such as marriages, ear-boring ceremonies, etc. Loans are taken either from the rich ryots or from the local Co-operative Credit Society.

Village Trade: The weekly market held every Saturday in the village is the main place where the villagers buy and sell their commodities and to a small extent it is carried to the neighbouring *shandies*—Avanasi or Kunnathoor. Nearness of Tirupur facilitates the selling of their cotton kapas. Marketing is made easy by the first class trunk roads leading to important commercial centres. About 60% of the agricultural produce is sold in the village itself and only 40% goes out of the village. The ryots do not sell their produce immediately after harvest. After meeting their wants, the excess only is sold. Cotton is mainly sold through the Tirupur Co-operative Trading Society of which most of them are members.

There are two Rural Co-operative Credit societies, one at Perumanallur and the other at Purasapalayam. The former was started in 1917 and has at present 42 members on the roll. The paid-up share capital is Rs. 814, and the value of each share is Rs. 10/—. Short term loans alone are given and the maximum period for clearing a loan is 5 years. The amount outstanding on loan is Rs. 3721 of which Rs. 1093 has not been repaid since 1925. The interest is charged @ 1½ pies per rupee per mensem. The interest that could not be recovered on account of the bad debt of Rs. 1093 is Rs. 1500. Apart from the bad debts and interest, the other members repay their loans regularly. The society has its own Panchayat of five members with its honorary President and Secretary. The society at Purasapalayam was started in 1929 and has at present on rolls 34 members. The amount outstanding on loan is Rs. 1326 and interest Rs. 260. There are no bad debts in this society and members repay their loans regularly. Besides the above two credit societies, there is a Coperative Seed Society at Perumanallur. It was started in 1928 and at present it is confining its activities to cotton seed alone and the Agricultural Demonstrator at Tirupur helps the president largely in carrying on the work satisfactorily. Departmental improved strains of cotton seeds are distributed to the ryots on loan and the produce is ginned together and sold on a co-operative basis by the Demonstrator on behalf of the society in a favourable market and the money is distributed to the ryots after recoveriug the value of seeds distributed and other loans incurred. This society has at present on the roll 99 members and the paid-up share capital is Rs. 1255 and the outstanding loan is Rs. 1590. Besides the borrowings from the above credit societies, the ryots have borrowed Rs. 7000 under the Agricultural Loans Act and Land Improvement Act of which Rs. 2000 is on short term loan and Rs. 5000 on long term loan. Of this Rs. 900 have been repaid.

The only source of communal income for the village is the levy of fines by the village committee for certain offences. There is a committee for each community which prohibits its members from

committing certain offences as drinking, adultery, etc. Any violation of the rule is punished with a fine ranging from Re. 1—4—0 to Rs. 50 according to the degree of the offence. The Committee meet, with all the members of the community and the offender is tried. If found guilty, he is fined and unless the fine is paid there is a social boycott. Two years ago, about Rs. 50 was collected and the amount was spent in repairing a Mariamman temple and digging a well for it. After this, no such amount has been collected and certainly this is not due to the absence of crimes but due to the relaxation of the rules of the Panchayat which at present, is not functioning properly.

There are three large temples in the village and in two of them there is an annual car festival and fire-walking ceremony. The expenditure for this is estimated to be about Rs. 600. The temples are managed by the Religious Endowment Board with its local Devasthanam Committee and the expenditure of the temples is met by the Board. The temples have their own Inam lands.

The village, is free from infectious diseases such as plague, cholera and small pox, but many people suffer from various skin diseases. There is a local allopathic dispensary where medical aid is available and nearly 60% of the sufferers seek medical aid. The rest either suffer or resort to quacks. There is about 40% of infantile mortality which is highest in the Adidravida quarters.

There are no private latrines attached to the houses, with the result that open fields and roadsides are used as latrines. A fortnight back two latrines have been built by the Health Department, but advantage is not yet taken of this. Every house has a well for drinking water and water is drawn from it.

Education. There is a District Board Tamil School in the village teaching up to IV standard and managed by two teachers. It has on its rolls 40 boys and 8 girls The following table illustrates the strength and the average age of pupils :—

Standard.	Strength.	Average age.
I	20	7
II	15	9
III	8	10
IV	5	12

About 2% of the adults can read and write Tamil and only two persons in the village are literate in English. There are 2 *purohits* (priests) who are versed in religious books. The few religious books of these *purohits* are the only collection of books in the whole village. Four boys have gone up for High School education to the neighbouring towns. The only gentleman who has received collegiate education has settled down on his land. Nobody from the village has gone to an Agricultural College. Most of the ryots who have learnt to read and write have forgotten the alphabets on account of their not being in touch with books.

Village Administration. The administration of the village is carried on by the Village establishment consisting of a Village Munsiff, a Karnam, two Thalayaris and two Vettis. The Thalayaris function as the Village Police as well. There is a Civil Panchayat court consisting of seven members which settles civil disputes up to Rs. 50. Besides, there is a local Post Office and the mails are carried by a runner. There is the usual contact of the villagers with higher authorities such as Tahsildar, Police Inspector and Agricultural Officers who often visit the place. Recently the place has become the scene of rife between two rival factions among Goundars. Major criminal and civil disputes are settled in the courts.

Economic deterioration seems to have set in and this is clearly indicated by the number of the ruined houses. The whole of *Paracheri* is vacant now, the inhabitants having migrated. With the improvement in the cotton market there is a possibility of sinking more wells in the lower slopes of the dry-lands and increasing the area under intensive cultivation, and with the increased growth of Cambodia cotton, there are possibilities for improving the industrial resources of this village.

Recent Changes in Horticultural Practices *

BY SOHRAB R. GANDHI, M. Ag.,

Assistant Horticulturist, College of Agriculture, Poona.

In the course of his lecture Mr. Gandhi spoke at length on the propagation and the most modern cultural methods for fruit trees as practised in different fruit growing countries of the world. Regarding the propagation of woody dicotyledons, he said that while making a stem cutting the basal cut need not necessarily be close below a bud; but very often inter-nodal basal cuts give better results and the close-below-bud cut is only desirable in case of stems which already possess pre-formed root initials in or near the nodal region.

The present practice of layering end branches of large orchard trees by tongue, ring or bending methods as practised in India is wasteful. A ground nursery could be more advantageously established of young trees closely planted in rows and these could be bent flat on the ground. The young shoots arising from the horizontally laid main trunk and branches could be rooted by mounting earth around their bases after they have made a six inch growth. Plants that root with difficulty could be made to root by etiolating these layer shoots before they break from their buds. This is effected by excluding light from the buds during the earlier stages of their growth by means of covering them with a layer of soil. The young shoots thus develop in the dark and push their way through the soil above. Such shoots are etiolated at their base and develop a satisfactory root system. The rooted shoots could be annually removed in the propagating season except one or two vigorous shoots at the base of the trunk which could be again used to lay flat for producing next year's crop of rooted shoots. This method of etiolating layer shoots has been perfected and commercially adopted in England by the Fruit Research Station at East Malling.

* Abstract of the lecture delivered on October 12, 1934.

Note. The lecturer just returned to India after two years' absence in Europe, United States of America, Dutch East Indies and the Far East.

The most recent advance in grafting difficult evergreen trees like mango and rubber is budding by the modified Forkert method (developed by the Java Department of Horticulture) which consists in making a transverse incision in the bark of the stock as far as the cambium after which the bark over a length of 1½ inches and a width of ⅓ inch is pulled down in several strips. From the strips of bark torn loose, two thirds are cut off and the ends trimmed. A shield-shaped bud with no wood adhering is then inserted and bound up with raffia fibre. By this method 80 to 100 per cent success is claimed and no other practice of grafting the mango is in vogue in Java. The lecturer felt very sanguine over developing a similar practice for the propagation of mango for South Indian conditions as the operation of budding is so much simpler, quicker and more economical than any other method of grafting.

In all other citrus growing countries except India, the budding of oranges is done with scion buds *attached* underneath with their wood. In India the traditional practice has been to invariably *remove* the wood and use the bud with the bark only. Considerable time and energy could be saved by *budding with wood* if careful study is made of the kind of bud to be used and the season of budding.

The lecturer then dealt with the most interesting subject of stock and scion relationship and pointed out that the question about the standardization of root stocks has been altogether neglected in India and the highly varying sizes of our orchard trees is partly due to the influence of the seedling on which the scion is grafted. If the ever-varying seedling stock were avoided and methods like layering by etiolation could be adopted to propagate the stocks vegetatively, troubles such as dwarfing, sterility and susceptibility to diseases of the orchard trees could be done away with.

In the case of standardizing root stocks of the citrus and the mango, the problem of propagating them vegetatively becomes simpler due to high percentage of apogamy exhibited by seeds of many citrus varieties in India and the varieties of *Mangifera indica* found in the Philippines and Java. The polyembryonic Philippine mangoes could be advantageously introduced in India for serving as standardized stocks for grafting the mono-embryonic Indian types and the citrus stocks could be very easily standardized by removing a few variant seedlings (result of normal fertilization) from amongst the many apogamic seedlings in the nursery beds. Very valuable work is being done in the University of California on the standardization of citrus stocks.

Affinity between stock and scion is another important factor and many varieties which do not unite well directly could be successfully grafted by means of "sandwiching" or "double grafting" which consists in using a piece of stem of a third individual as intermediate between the conflicting stock and the scion Many overgrowths and undergrowths above and below bud joints of citrus trunks could be avoided by careful study of stock and scion congeniality. The degree of congeniality is correlated in considerable measure with the degree of genetic relationship between the two types united. Very recent work in England, California (U. S. A.) and Japan on the stock and scion relationship goes to prove that the scion has considerable quantitative influence on the root system of the stock, but there is a very sharp difference of opinion whether the scion is able to influence the stock qualitatively and change the nature of the root system of the stock after its own kinds.

In parts of the Philippines which are subject to typhoons, young mango trees are bent horizontally on the ground and the trunk allowed to root at several places. The branches creep close to the ground and the crown appears elliptical in form.

In California (U. S. A.) many unfruitful citrus trees are made fruitful by ringing their trunks by giving knife edge cuts and many-shy bearing grape vine varieties are made to bear luxuriant crops by adopting the cane pruning system.

The mango is forced to fruit out of season in the Philippines In the mango district near Manilla the mangoes are annually forced into fruiting for the Manilla market. The forcing is done by burning brush on the ground beneath the mango trees in a cone shaped enclosure of bamboo matting, with a tall chimney ending in the top of the tree. Thus the tree is "smoked" heavily day and night for a week. Thereafter light fires are made morning and evening for about a month till the trees come into bloom. The mango trees can be forced to fruit any time of the year by this method provided there is bright weather during the flowering, for rain invariably destroys the flowers.

Speaking on the cultivation and irrigation of orchards the lecturer said that the problems were closely related with the root system of the fruit tree and the drainage of the sub-soil.

It is doubtful if the cultivation of the surface conserves moisture or increases root aeration. The crop yields are not increased simply by reason of stirring the surface of the soil.

The main purposes of cultivation are: to remove weed competition, to facilitate irrigation or to aid in the absorption of water to incorporate manures and to control pests.

Organic manures and cover crops are essential for successful orcharding under Indian conditions.

It is possible to reclaim boggy, low-lying areas and grow fruit trees in highly retentive clay soils if the Chinese method of 'Island cultivation' were adopted. The Chinese method of cultivating fruit trees and vegetables in rice lands, comprises a system of canals. dikes, raised beds and ditches providing for irrigation as well as drainage.

Breeding Bull Service for Cattle Improvement.

Rao Bahadur K. G. Srinivasa Mudaliyar, Avl., President, The Tanjore District Co-operative Manure Society, Ltd. Nidamangalam writes:—

In January 1933 the Agricultural Bank, Nidamangalam lent a Buffalo breeding bull to the Co-operative Manure Society, Nidamangalam service.

From 8—1—33 to 30-6—33 the statement of receipts and charges of the breeding bull service runs thus:—

RECEIPTS	Rs.	As.	Ps.	CHARGES	Rs.	As.	Ps.
1. Service fees	81	5	0	1. Straw	7	4	9
2. Manure sold	3	12	0	2. Green fodder	2	12	6
3. Gunny sold	0	5	0	3. Cotton seed	23	6	0
				4. Rice bran	3	11	6
				5. Medicine, oil etc.	3	12	3
				6. Wages of attendant	41	1	0
				7. Nose string	0	5	6
				8. Note book	0	5	6
				9. Batta	2	8	0
				10. Profit			
				½ to Nidamangalam Agl. . Bank.	0	1	6
				½ to Manure Society.	0	1	6
	85	6	0		85	6	0

About 92 buffaloes have been served in the above period. For each service a fee of as. 14 is collected.

From 1—7—33 to 25—5—34 the Receipts and Charges run thus:—

RECEIPTS	Rs.	As.	Ps.		CHARGES	Rs.	As	Ps.
1. Service fees	105	14	0	1.	Wages of attendant	55	8	0
2. Gunny sold	0	11	0	2.	Cotton seeds	35	7	0
3. Manure sold	6	11	6	3	Straw	12	10	0
4. Agricultural Bank				4.	Rice bran	5	5	3
(Received for feeding charges)	18	10	6	5	Green fodder	1	1	0
				6.	Nose string etc.	1	1	0
				7.	Castor oil	0	7	0
				8.	T. A. for attendant (for the sale of the Bull)	3	4	0
				9.	Agricultural Bank (Amount refunded)	17	3	9
	131	15	0			131	15	0

About 121 buffaloes have been served during this period.

The society has extended the service of the bull to all the villages lying within 10 miles radius. The following account books were maintained.

1. Receipt Book.
2. Cash Book.
3. General Ledger.
4. Service Register

and 5. Voucher File.

In the Service Register the age of the animal, the owner of the animal, whether the buffalo has been served or not and other items of interest will be found. The bull earned its maintenance. The society did not receive any maintenance grant from the government. The net loss to the Agricultural Bank is about Rs. 23/- though the benefit achieved by the ryots is very encouraging. 213 good calves have been produced. Converting this into money value about Rs 1000/- have been gained by those who took advantage of this service. The average calf is valued at Rs. 5. The calf produced by the breeding bull is worth Rs. 10/- So the economic benefit is Rs. 1000/-. Profit is not the criterion in a Co-operative Society but the benefit is taken into account.

Though the Tanjore Dt. Co-operative Manure Society is in a good financial condition its work for the last four years was not encouraging. Acute depression prevailed Members had no purchasing power and the Society worked at a loss of Rs 40—13—0 during the year 1933—34.

Two important achievements of the Nidamangalam Manure Society during the last four years of depression are its breeding bull service for cattle improvement and the organisation of a Co-operative Loan and Sale Society as adjunct to the Manure Society This is the only non-credit agricultural society that has survived similar non-credit societies and which is doing good work. The society is in a good financial condition. Its financial particulars on this date (9—5—35) are as follows.

ASSETS

	Rs.	As.	Ps.
1. Shares in the financing bank	300	0	0
2. Paid up share capital of the members	1155	2	9
3. Share capital in Central Co-op. Printing Works	16	6	0
4. Reserve Fund	1207	0	0

5. Savings deposit in the Central Bank				488	0	0
6. Do. in the Post Office				20	0	0
7. Value of stock on hand						
Bone meal	226	8	0			
Gunnies	5	13	0			
Meston ploughs and Triangular harrows	20	4	0			
				252	9	0
8. Furniture				35	0	0
Cash Balance.				75	12	11
Total.				3549	14	8

LIABILITIES

Paid up share capital of the members	1155	2	9

The Nidamangalam Co-operative Loan & Sale Society Ltd., No. T. 793.

One of the resolutions passed at the Agricultural Co-operative Conference held on 28—10—27 under the presidency of Mr. Anstead the then Director of Agriculture runs thus: "That a Co-operative Loan and Sale Society be organised as an adjunct to the Tanjore District Co-operative Manure Society Ltd., Nidamangalam"

In accordance with that resolution Rai Sahib A. Seturama Iyer organised a loan sale society on 29—11—34 which was registered on 11—2—35 and started its operations on 13—2—35. Nidamangalam being a place of agricultural and paddy trade importance with first class godowns attached to the various rice mills, which have been of late lying idle, is suitably situated for the location of the loan and sale society. In these days of agricultural and trade depression the plight of the agriculturists is very miserable. After meeting the Government kist, even the cost of cultivation is not realised. For meeting the Government demand in January, February, March and April they have to sell the produce at a very low price. For meeting their family expenses, they are obliged to sell their produce at a low price since they have no purchasing power. To sell the produce of the members to the best advantage and to advance loans to members on the security of their produce the above loan and sale society commenced its work on 13—2—35.

The capital of the society for the present is Rs. 10,000/- made up of 1000 shares of Rs. 10/- each. Every member shall take at least one share but no member shall take more than 50 shares. The maximum borrowing power of the society is fixed at 15 times the paid up share capital and reserve fund.

The entire capital required will have to be met from borrowings from the Central Bank. The Central Bank need entertain no fear as the securities will always be kept under their own custody and subject to such conditions as the Bank dictates. The individual maximum borrowing power is fixed at Rs. 6000/-. The members are also made eligible to borrow at the same proportion which exists between the Central Bank and the society. The jurisdiction of the society is confined to the Nidamangalam Registration sub-district except the villages of the Nannilam taluk. The financing bank lends to the society at 5½ % and the society lends to the members at 6½ % with a margin of 1 %. No loan shall be given exceeding 75% of the market value of the produce pledged by the borrowing member.

There are now 28 members with a paid up share capital of Rs. 3490/-. The society has advanced loans to the members Rs. 39,014/- on the pledge of 34,000 kalams of paddy (or 8,16,000 Madras measures) worth about Rs. 53,000/- within the space of about 2 months. The receipts and charges from 13—2—35 upto 9—5—35 are as follows:—

RECEIPTS

Share capital	Rs.	3560	0 0
Entrance fees		89	0 0
Miscellaneous receipts		8	8 6
Central Bank loan		36505	0 0
Incidental charges recovered from members ...		19	3 0
Adjusting heads—due to society		1	4 0
Loans repaid by members		227	0 0
Survey fees recovered from members ...		1	4 0
Interest paid by members		2	14 0
Central Bank savings deposit		34	0 0
Total.		40448	1 6

CHARGES

Shares in the Tanjore Co-operative Central Bank ...		800	0 0
Furniture		8	8 0
Loans to members		39014	0 0
Contingent charges		112	12 3
Incidental charges incurred for members ...		19	3 0
Interest paid on Central Bank loan		59	4 8
Adjusting head—Due to society		1	4 0
Savings deposit in the Central Bank		100	0 0
Share capital refund		70	0 0
Central Bank loan repayment		260	0 0
Survey fees incurred for members		1	4 0
Closing balance.		1	13 7
Total.		40448	1 6

ABSTRACTS

Factors influencing Phosphate fixation in Soils. (*Soil Sci.*, 1935, *39*, 327). Older investigations having indicated that phosphate fixation in the soil is most influenced (in the order of decreasing importance) by pH, Ca, and the Silica-sesquioxide ratio of the soil colloids, Hibburd has studied how fixation is influenced by the presence of water alone, or with small amounts of added salts so as to correspond to soil solutions. To obtain an estimate of the fixing capacity of different soils the author determines the "fixing power" (defined as the number of milligrams of phosphate that must be added per kilo of soil so that a 1:1 water extract will contain 1 p. p. m. of phosphate) of each soil. This is an empirical unit, as the fixing power of soils is not definite, being influenced by the amounts of phosphate and water added. Fixation is a time reaction, the rate depending on the proportion of water to soil. Experiments with $CaH_4(PO_4)_2$ and $(NH_4)_2HPO_4$ under optimum moisture conditions showed that for the same amount of phosphate added, the acid $Ca H_4 (PO_4)_2$ was least and the neutral $CaHPO_4$ most fixed in the majority of cases; in a few cases however, the ammonium phosphate was most fixed, thereby suggesting that for every type of soil there exists one salt which is most effective for fixation. The finer fractions of a soil fix better than the coarser.

Addition of equivalent amounts of the common cations present in soil solutions increased the solubility of phosphate in the order Ca, Mg, K, Na and NH_4. Addition of soluble silica, organic colloids and organic compounds of phosphorus and lowering the pH also increased the solubility of phosphate. The results of experiments designed to reduce the fixing power of soils by replacing the high fixing cations Ca or Mg by H or K were not reliable owing to the errors introduced by the deflocculation of the soil. Repeated wetting and drying rendered soil phosphates more insoluble. Many substances—both organic and inorganic—other than soil, are capable of fixing phosphates. Of the materials tried, permutite had the greatest fixing power, talc, mica, kaolin and impure infusorial earth had considerable fixing power, while diatomaceous earth feldspar and $BaSO_4$ had no fixing power.

All the results were obtained with equilibrium extracts as preliminary experiments with percolation extracts gave discordant values. Y. V. N

Studies on Protein Synthesis by the Genus Azotobacter. *Soil Sci* (1935), *39*:327 Greene has examined the products of metabolism off our species of Azotobacter—*A. chroococcum* Beijerinek, *A. Vinelandii* Lipman, *A. agilis* Beijerinek, and *A. beijerinekii* Lipman. Pure cultures of these were grown on nitrogen-free mannite agar and incubated at 30°C for 4 days, after which period they were dehydrated using anhydrous acetone, and the dry materials analysed. Chemical analyses showed that *A. agilis* and *A. Vinelandii* contain larger amounts of protein and ash and smaller amounts of carbohydrates than the other two, Again, the first group (*A. agilis* and *A. Vinelandii*) contain larger amounts of hemicelluloses and crude protein while the second group (*A. beijerinckii* and *A. chroococcum*) is characterised by a greater content of lignin-like materials. This close similarity in composition between these organisms also extends to their nitrogen fixing capacities although however the ratio of nitrogen fixed is not proportional to the nitrogen content of the particular species, thereby indicating that *A. beijerinckii* and *A. chroococcum*, which have lower nitrogen content, have a higher growth rate.

The proteins present are chiefly globulins, glutelins and albumins. Arginine and lysine are the principal amino-acids of the basic fraction ; tyrosine tryptophane, cystine and histidine are present in smaller amounts. The non-basic fraction (amounting to about 40% of the total N) is probably composed of the simpler amino acids. Owing to the non-specificity of the test, much significance cannot be placed on the positive reaction for glutathione given by all the four species with sodium nitroprusside. It is probable however that a part at least of the cystine present is traceable to the oxidation of cysteine—a part of the glutathione molecule.

Protein synthesis is postulated to take place in the following stages—Carbohydrate degradation results in the production of various organic acids and active hydrogen, the latter being utilised by the organisms to fix nitrogen as ammonia. The ammonia reacts with the organic acids to form amino-acids which are subsequently converted to protein. Y. V. N.

Vitamin A active substances in Egg Yolk. Grillam Heilbron, *Biochem J.* (1935)*29*: 1064. The detection of Vitamin A in eggs claimed earlier by Euler and Klussman using the Carr-Price reaction is not quite conclusive owing to the non-specificity of the test and the presence of interfixing substances. The present authors have effected a phase test separation of the carotene of the unsaponifiable matter of egg yolk from the xanthophyll, and by absorbing the latter on calcium carbonate obtained Vitamin A free from carotenoids. The presence of Vitamin A has been confirmed both by the antimony trichloride blue test and by the characteristic absorption band at 328 M. Egg yolks of fowls fed on rich maize diet had a higher

krypto Xanthin content. The Vitamin A active carotenoid of this eggyolk is still very small (order of 0·2 mg per 100 grms of yolk). Yolks produced by hens on a richer grass diet had a higher Vitamin A content.

Rates of Inactivation of Tobacco Virus at different H-ion concentrations. Stanley (*Phytopath.* (1935) *25* : 475) as the results of experiments with diluted untreated infectious juice of mosaic diseased plants of *Nicotiana tabacum* L. (Var. *Turkish*) arrives at the following conclusions regarding the rate of inactivation of the virus at different H-ion concentrations.

pH.	Rate of inactivation.
3—8·5	Negligible.
1·5—2·5.	Fairly rapid.
9·0—10·0—	
0·5—1·5	Very rapid.
11·0—12 0	

Temperature does not seem to be a factor since similar results were obtained at 20 and 14° C. Purified preparations of the same virus did not show any appreciable difference in behaviour. Virus preparations completely inactivated at pH 12, 11, or 12, and then adjusted to pH. 6 were not reactivated. Y. V. N.

Influence of P. and K. supply on host susceptibility to yellow tobacco mosaic infection. (Spencer, *Phytopath*, (1935) *25* : 493). In a previous communication (Spencer, Phytopath, (1935) *25* : 178) it was shown that small additions of nitrogen increased plant growth more than plant susceptibility to virus infection. The correlation between phosphatic and potassic host nutrition and host susceptibility has now been studied when phosphatic nutrition was under study, K and N were maintained constant (10·0 mg and 31 mg respectively per plant per day) while P was varied from 0—150 mg. It was observed that dosages of P from 5—80 mg. resulted in equally good growth and equally high susceptibility. Higher doses of P lowered both growth and susceptibility, thereby warranting no direct correlation between phosphatic nutrition and susceptibility. In the potassium studies, N and P were constant (14·6 and 10·0 mg. respectively per plant per day) and the K ranged from 0·500 mg. Good growth was noticed when the K dosages were 10—150 mg. and fell off there-after due to excess potash. Susceptibility was highest with very low amounts (10—20 mg. per day) of K. and decreased when the K dosages was raised (20—150 mg), thereby indicating that host susceptibility to infection is influenced more by potassium than by growth.

Effect of parboiling rough rice on milling quality. Jones and Taylor in a valuable contribution (U. S. Dept. of Agriculture, (1935) circular No. 340) discuss the results of preliminary experiments in parboiling varieties of rice grown on a commercial scale in the United States The long grain varieties *Fortuna*, *Nexora*, (of the same general type as the *Patna* of British India), *Edith* and *Iola*, the medium grain *Blue rose* and the short grain varieties *Colusa* and *Calora* were tried. The results can be summarised as follows:- *Duration of steaming* ; soaked for 24 hours at room temperature (25--30°C) and steamed for varying periods (5, 15 and 25 minutes). The percentage yield of head rice was materially increased for all varieties steamed 15 and 25 minutes with the exception of *Blue rose*. Steaming for 5 minutes is insufficient and steaming for more than 15 minutes is unnecessary. *Length of soaking period.*—There was no appreciable difference in the yield of head rice (varieties *Fortuna* and *Rexora*) from samples soaked for 23, 25, 29 and 47 and 93 hours at room temperature and then steamed for 20 minutes or more. On the other hand, samples soaked for only 2 hours at a constant temperature of 70°C and steamed for 35 minutes gave a high percentage of head rice, thereby suggesting that soaking at high temperature for a relatively short time may be adequate preparation for steaming. *Duration of soaking and temperature.*—The long grain varieties *Fortuna* and *Rexora* were soaked for 12, 18, 24 and 30 hours at

temperatures of 40, 50, 60, and 70°C and for 1, 2, 3, and 12 hours at 80°C. It was observed that soaking for more than 12 hours had no marked beneficial or deleterious effect at any of the temperatures tried up to 70°C. Likewise, the period of steaming (20 or 35 minutes) also had no effect on the yield of head rice. Samples soaked at 70°C and 80°C and not subsequently steamed showed that rice starch begins to gelatinise at temperature varying from 60 to 75°C. *Colour.*—The colour of the parboiled rice varied from nearly translucent to different shades of amber, depending on the colour of the rough rice, the temperature and duration of soaking and steaming. Relatively short period of soaking at room temperature caused least change of colour while samples soaked at 60°C and above developed the amber tint. In all cases increasing the period of steaming deepened the colour of the finished product. Y. V. N.

Gleanings.

A Substitute for Dishorning. It is well known that polled or dishorned cattle can be managed with greater facility than horned animals. Dishorning cattle by sawing off or otherwise entirely removing the horns after they are partly or fully grown is prohibited by the Animals (Anaesthetics) Act. 1919, unless the animal during the whole of the operation is under the influence of some general anaesthetic of sufficient power to prevent it feeling pain. The Ministry therefore desires to call the attention of breeders and stock owners to a method of preventing the growth of the horns by the application of caustic potash to the hornbuds of young calves.

Clip the hair from the top of the horn when the calf is from 2 to 5 days old. Slightly moisten the end of a stick of caustic potash with water (or moisten the top of the hornbud) and rub the tip of each horn firmly with the potash for about quarter of a minute, or until a slight impression has been made on the centre of the horn The horns should be treated in this way from 2 to 4 times at intervals of 5 minutes. If, during the intervals of 5 minutes after one or more applications, a little blood appears in the centre of the horn, it will then only be necessary to give another very slight rubbing with the potash.

The following directions should be carefully observed. (1) The operation is best performed when the calf is under 5 days old, and should not be attempted after the 9th day. (2) Caustic potash can be obtained from any chemist in the form of a white stick. When not in use it should be kept in a stoppered glass bottle in a dry place, as it rapidly deteriorates when exposed to air. (3) One man should hold the calf while an assistant uses the caustic. (4) A piece of tinfoil or brown paper should be rolled round the end of the stick of the caustic potash which is held by the fingers, so as to avoid injury to the hand of the operator. (5) The stick should not be moistened too much or the caustic may spread to the skin around the horn and destroy the flesh. For the same reason, the calf should be kept from getting wet for some days after the operation. (6) Great care should be taken that the calf does not suck the cow until the potash has lost its corroding power, otherwise, there is a possibility that the cow's udder may be injured. (7) Care should be taken to rub the centre of the horn and not round the side.

Note—Caustic potash is poisonous and must therefore be kept in a safe place.

(Advisory Leaflet No. 228 of the *Ministry of Agriculture and Fisheries*)

Perfume from Fungus—A Rothamsted Discovery. The discovery that fragrant perfumes can be extracted from a certain type of fungus was made at the Rothamsted Experimental Station, Harpenden.

The discovery was made by Mr. Geoffry Samuel, Rothamsted's new mycologist, who is studying plant diseases caused by soil fungi. In the course of his work he noticed that some of the "actinomycetes" picked out from the soil had the power of making fragrant perfumes.

Mr. Samuel also found among the by-products of certain milk effluent investigations a substance which he had been anxious to destroy, but which subsequently appeard to be of considerable value as a means of enhancing scents.

Times of India, 2nd July 1935

Quality of Wheat. The quality of wheat as influenced by environment is the subject of a recent paper by F. T. Shutt and S. N. Hamilton (*Emp. J. Exp. Agric.*, 2 : 119). The question is not one of scientific interest only, but also of the first commercial importance in the flour-milling and baking industries. Value in wheat depends chiefly on the character and amount of the protein (gluten) it contains, but whereas the former is essentially an inherited factor, the latter may be considerably influenced by environmental conditions. The time which elapses between the formation and ripening of the kernel practically controls its gluten content—the shorter the period the higher the percentage—so that seasonal conditions such as high temperatures and absence of excessive moisture during the later stages of development, which tend to hasten ripening, result in a valuable high-protein wheat Conversely, a starchy grain is produced if climatic conditions tend to prolong growth during this period. The richness of the soil, even as regards its nitrogen content, does not appear to have much influence on the quantity of protein in the grain, but its moisture absorbing capacity may be of considerable importance as it is necessarily closely associated with the rate of ripening of the crop. From data which have been collected over a period of twenty-eight years at a number of stations in Canada, it has been deducted that the excellent quality of the wheats from the Prairie provinces is largely to be attributed to the favourable seasonal conditions that obtain, and not solely to the selection of the most suitable varieties for that district.

Nature, Vol. 135, No. 3413, Page 502.

Vernalisation. Since the publication of Bulletin No. 9 on vernalisation by the Herbage Bureau, Aberystwyth, research on the subject have been proceeding rapidly in the U. S. S. R, The many conflicting statements that have appeared in the scientific and popular literature, however, have made it desirable that an authoritative account of the subject should be given, and the Bureau, with the collaboration of Prof. N. A. Maximov, of the Institute of Grain Husbandry Saratov, U. S. S. R, has issued a further publication, "The Theoretical Significance of Vernalization" as Bulletin No. 16 in the Herbage Publication Series (Aberystwyth : Imp Bur. Plant Genetics 2s. 6d) Since the discovery that by subjecting partially soaked seed to low temperatures, winter varieties, of cereals could acquire the properties of spring varieties, that is, yield the same summer, the investigations have been extended to other types of plants. In the case of soy bean and cotton, vernalisation is effected by exposure of soaked seed to sufficiently high temperatures, after which fruit is formed successfully, even if subsequent temperatures would normally be too low. On the theoretical side Lysenko's views are discussed in full, the most important of which seems to be that growth and development are essentially different phenomena. The plant, although in an apparently dormant condition, may be undergoing transitional developmental processes which can be profoundly affected by external conditions. Changes in the nature of the plant's composition are also brought about by vernalisation, both the colloidal properties of the protoplasm and the staining reaction of the embryonic tissue being altered after treatment. The first idea, that vernalisation actually accelerated plant development, is now regarded as

needing modification. The truer interpretation seems to be that part of the growth period, which normally takes place in the field, can be transferred back to the early germination stages. The question as to whether or not vernalisation is an irreversible process is still a debatable point.

(*Nature*, Vol. 135, No. 3407, February 16, 1935, Page 273)

Food-Stuffs Field Beckons Chemists. Considering the billions of dollars that America spends for food, we really have pathetically little definite scientific knowledge about food-stuffs, says Arthur D. Little's Industrial Bulletin.

"Many dietitians still evaluate foods on the calory (heat-producing) basis, and may or may not go so far as to recognise the need of providing the calories from foods of various types, including protein. Some recognize the functions of the various vitamins, and occasionally, the need for mineral constituents. Certain individuals seem to need much bulk in their food, whereas others may be irritated by bran and even spinach and other bulk-products, but, if the fad of the moment is to have bulk, it will go into many diets. While a few progressive investigators now distinguish between the various kinds of proteins and their relative importance to the person or animal, there is still a long way to go in understanding the chemistry of foods, even without regard to the peculiarities of the needs of individuals.

"Butter fat, for instance, is not at all simple, for one investigator was able to separate it into some 37 fractions. Some of these parts may be of far greater importance than others. Further, the composition must vary greatly with the feed of the animal, as is known to be true of other fats. Recently, milk is being 'softened' as water is softened, to remove some of the excess lime, which is apparently of more utility to the calf than to human babies. Thus we still know very little about such an important food as milk, and the situation is hardly, if any, better in the cases of grains and various other foodstuffs.

"It is still necessary to use rats and other laboratory animals to measure the vitamin values of foods, for adequate routine chemical determinations have not been developed. Relatively little is yet known about the harmones or chemical regulators of the body, although a salutary and determined assault is being made on this field by some splendid workers. Some of these harmones undoubtedly enter our bodies by way of food. By their intelligent use we may secure more control over our activities than we now can realize.

"Important and promising studies are under way pertaining to the nutrition and welfare of the human body. Enough has already been found to suggest great benefits to come, but also to suggest conservatism in making or accepting claims for universal beneficial effect for any one food product or ingredient. In this branch of human knowledge, we are still in a state of great ignorance."—A. E. B. in *Scientific American*, Vol. 151, No. 5.

Dr. T. V. RAMAKRISHNA AYYAR

An Appreciation.

Rao Sahib Dr. T. V. Ramakrishna Ayyar retired from Government Service on the 20th of this month. In his retirement the Madras Agricultural Department loses the services of a distinguished entomologist and an able officer. Associated at the beginning of his career with eminent entomologists like the late Professor Maxwell Lefroy and Mr. Bainbridge Fletcher, Mr. Ayyar fitted himself very early in his life for the career of an independent research worker, and was, in

company of these great men one of the pioneers in the field of Entomological Research in India, and during 30 years of active service has contributed not a little towards the advancement of the science. Of active habits, endowed with rare gifts of observation, imbued with a high sense of duty, and an unbounded enthusiasm for his work, possessed of prodigious amount of energy and with a desire to excel in whatever he chose to do Mr. Ayyar plunged himself whole heartedly ino his work, and pursued the object of his study with unabated zeal for 30 years, through the vicissitudes of his long and varied official career, and carved for himself a niche in the temple of fame amongst the entomologists of the world.

Tarakad V. Ramakrishna Ayyar was born in the year 1880 in Tarakad Village, Palghat and received his early education in the Victoria College and Native High School, Palghat. He entered the University in 1894 and graduated with distinction from the Madras Christian College in the year 1898. During his undergraduate days he evinced a keen interest in the biological sciences and after graduation was awarded the Buckie Studentship for post-graduate study which he held for two years. During this period of training he spared no pains to thoroughly acquaint himself with all the available zoological literature with special reference to Entomology. Like many other eminent men who have made their mark in science Mr. Ayyar entered life first as a teacher in the Rajah's College, Ernakulam. But it was only in the year 1904 that Mr. Ayyar first began his career as an entomologist when he was appointed as the first assistant to the first entomologist to the Government of India, the late Prof. Maxwell Lefroy, who was greatly impressed with his young Indian assistant. In the year 1906 he was transferred to Madras as Senior Entomological Assistant; Thrown on his own resources Mr. Ayyar found opportunities to show his powers of initiative and independent work and acquitted himself very creditably during this period. When Mr. T. B. Fletcher was appointed as Entomologist to the Government of Madras, Mr. Ayyar was chosen as his First Assistant. In the year 1915 Mr. Ayyar was appointed as Acting Government Entomologist in the Indian Agricultural service a post which he held for four years. During this period Dr. Ayyar's inherent capabilities as an efficient administrative officer were brought to light. In 1920 Mr. Ayyar was gazetted as Senior Assistant Entomologist and when the Research Institute was separated from the College he was made Lecturer in Zoology and Entomology, a post which he held till 1930 when he was made Government Entomologist, ~~1927~~.

In 1927 Mr. Ayyar travelled abroad visiting Japan, China, United States of America and Europe acquainting himself with the progress of the science in these countries. While in America he received the

Ph. D. degree of the Stanford University. He retired from service as Government Entomologist. Just before retirement the title of Rao Sahib was conferred on him by Government in appreciation of his services.

It is difficult to assess the greatness of a living man without being open to the charge of flattery, but by common consent Dr. Ayyar takes his rank among the foremost entomologists of India. All aspects of entomological work received his attention but special mention must be made of his systematic work on Thysanoptera, Hymenoptera (especially parasites) and Rhyncota (coccidae). Dr. T. V. R. has discovered and described several new species and genera of thrips and parasitic hymenoptera. His published papers numbering about 120 give an indication of the extent to which recent entomological literature is indebted to him for its enrichment.

As a teacher Dr. Ayyar impressed his pupils as a man of outstanding ability. His powers of lucid exposition, his systematic method of approach, and his first-hand knowledge of the science he handled were his great assets and those who have had the privilege of sitting at his feet, could never forget the inimitable manner in which he taught them the fascinating subject of Entomology.

As an officer, Dr. Ayyar controlled his subordinates more by example than by precept. Punctual in attendance, conscientious in the discharge of his duties, quick in his decisions and disposals, never wasting a moment's time Dr. Ayyar was a model of efficiency. He was strict, but never unkind.

Dr. Ayyar has held many honorary offices and it was characteristic of him that he discharged the duties attached to them with the same zeal and ability as he showed in the discharge of official duties. As the first president of the Research Council, as Warden of the hostel for 6 years, a member of the Senate of the Madras University, as President of the Officers' Club and the first President of the Association of Economic Biologists he won the admiration of every one. In recent years he was closely associated with the M. A. S. U. and was the Editor of the *Madras Agricultural Journal* for two years and Vice President of the Union for one year.

On the social side, Dr. Ayyar's versatility, his keen sense of humour, and his remarkable conversational abilities gathered round him a host of admirers and friends who were kept in perpetual chuckles of merriment by his quips and jokes. He took a keen interest in all estate activities and was a conspicuous figure in all functions.

On behalf of the readers of the *Madras Agricultural Journal*, we wish him a long and happy life.

Crop & Trade Reports.

Groundnut. Sowings of the summer crop of groundnut are generally restricted outside South Arcot for want of timely summer showers. The sowings of the early crop have been delayed and are in progress after the recent rains.

2 Harvest of the summer crop of groundnut has commenced in parts. The yield is expected to be generally below normal.

3. The wholesale price of groundnut per Imperial maund of 82-2/7 lb. as reported from important market centres towards the close of June 1935 was Rs 6—5—0 in Vizagapatam; Rs. 6—4—0 in Cuddalore, Rs 6—2—0 in Vizianagaram, Rs. 5—11—0 in Salem, Rs. 5—10—0 in Vellore, Rs. 5—2—0 in Guntur and Cuddapah, Rs. 5—0—0 in Nandyal and Rs. 4—10—0 in Adoni. When compared with the prices in March 1935, these prices reveal a rise of 8 per cent in Cuddalore, 7 per cent in Vellore, 6 per cent in Vizagapatam and Vizianagaram and 5 per cent in Salem, and a fall of 5 per cent in Adoni, 4 per cent in Guntur and one per cent in Nandyal and Cuddapah.

Cotton Raw, in The Madras Presidency. The receipts of loose cotton at presses and spinning mills in the Madras Presidency from 1st February 1935 to 5th July 1935 amounted to 296,256 bales of 400 lb. lint as against an estimate of 445,600 bales of the total crop of 1934-35. The receipts in the corresponding period of the previous year were 343,309 bales. 178,065 bales mainly of pressed cotton were received at spinning mills and 78,450 bales were exported by sea while 36,436 bales were imported by sea mainly from Karachi and Bombay.

College News & Notes.

Weather. Though the hot weather has disappeared with the approach of the monsoon winds, rainfall continues to be in defect, the total recorded from the 1st of April being only 4·5 inches. During the second week of July, there were some showers on the Eastern hill slopes with the result that the tanks in the upper reaches have received some water. Unless a continuous supply is assured, the chances of a normal crop of paddy and other wetland crops appears to be in jeopardy.

College Day and Conference. Arrangements are in progress for the ensuing College Day and Conference and the several committees have begun their activities. One feature of the year's function will be an exhibition of the varied activities of the Department.

Short Course in Agriculture. Twelve students have joined the short course in Agriculture for gentlemen farmers. The classes began on the 18th June and are expected to run till March. The special subjects in which courses of instruction are arranged are Farm management, Care of animals, Dairying, Vegetable gardening, Bee-keeping, Jaggery making, Insect Pests and Diseases and Malt making.

Students' Club. The election of Office bearers for the current year came off on the 3rd instant with Mr. H. Shiva Rao, Vice-president in the chair. The following are the results of the elections.

Games Secretary	Mr. S. Albuquerque.
Club (literary) Secretary	,, K. Jayaraman.
Cricket Captain	,, H. Ramanatha Rao.
Hockey Captain	,, R. Ali Hyder
Foot-ball Captain	,, S Krishnananda Sastri
Tennis Captain	,, M. Joseph.
Representative for Class III	,, N. Ranganatha Chari.
,, ,, Class II	,, J. Roughuthan Reddy.
,, ,, Class I	,, Joseph Doss.

Welcome to Freshers. The annual function of welcoming freshers came off on the 9th July when the students of B.Sc. III and B Sc. II were 'At home' to the Students of B.Sc. I and the Short Course, Speeches were made by representatives of B.Sc. III, B.Sc. II, the lecturers and tutors. Representatives of the new students suitably replied.

Games. With the reopening of the college and the advent of the new batch of students, sports and games are in full swing. Cricket, football, tennis and hockey loom large in the weekly programme. The College opened their cricket season with a match against their neighbours the Forest College and won comfortably. On the 7th July the College met a Coimbatore eleven led by Mr. H. C. M. McLaughlin, Commissioner of the municipality. The College scored 180 runs for 7 wickets and declared. The visitors were dismissed cheaply thanks to the good bowling of U. Narasinga Rao and D. V. Rajagopalan. The visitors made an excellent rally in the second innings and scored 80 runs without loss before stumps were drawn. A match on the 13th instant between B.Sc. III and the rest ended in a very exciting finish. B. Sc. III started disastrously losing three wickets before any run was scored but registered 189 runs all told thanks to the splendid batting of H. Ramanatha Rao the College captain who scored 68 not out. The rest looked like losing the game till the end, but a fruitful partnership between Ganesh Sundar Rao and Kodandaraman changed the aspect of the game and the rest wrested victory from their opponents by a narrow margin. On the 14th, the Officers' eleven in which many old stagers participated put up a plucky fight against the students and scored 182 runs. Not disheartened by a tall score and limited time, the students went about their task in a business-like manner and passed their opponent's score for the loss of only 4 wickets. H. Ramanatha Rao again excelled himself by scoring 105 not out in a breezy innings. He was ably supported by Dinker Rao who made 152 runs.

Football, hockey and tennis are popular as usual and the playgrounds and tennis courts are largely patronised. A hockey match between Class III and Class III ended in a win for the latter by 5 goals to 2. It is gratifying to note that the freshmen promise to contribute a substantial quota to the College teams in the various games.

Social. The officers' club entertained Dr. T. V Ramakrishna Ayyar at dinner on the 19th instant on the eve of his retirement from service. Speeches were made eulogising Dr. Ayyar's long and intimate connection with the officers' club from its very inception and of which he was an office-bearer in various capacities for several terms.

Tungabhadra Soil Survey. The special staff engaged in the survey of the Tungabhadra irrigation project area returned to head-quarters after finishing their labours in the tract and are now engaged in the study of soils collected during the survey.

Board of Studies in Agriculture. Rao Bahadur M. R. Ramaswami Sivan, Messrs S. Sundararaman, K. Ramiah, M. C. Cherian and H. Shiva Rao who are members of the University Board of Studies in Agriculture, proceeded to Madras on the 8th instant to attend a meeting of the Board on the 9th. It is understood that Rao Bahadur D. Ananda Rao who was chairman of the board has resigned his chairmanship on his appointment as Director of Agriculture.

Visitors. Among distinguished visitors who recently visited the College and Research Institute were Dewan Bahadur Sir K. Ramunni Menon, Ex-vice-chancellor of the Madras University, Dr. Gurney, Entomologist, Sydney, Australia and Mr. Lowe, Economic Botanist, Federated Malaya States Dr. Gurney is on a visit to India to study the question of parasites of fruit-flies, and Mr. Lowe has broken his journey to Singapore at Colombo to acquaint himself with the work of the Ceylon and Madras Departments of Agriculture.

Weather Review (JUNE 1935).

RAINFALL DATA

Division	Station	Actual for month	Departure from normal	Total since January 1st	Division	Station	Actual for month	Departure from normal	Total since January 1st
Circars	Gopalpore	4·4	−1·4	6·1	South	Negapatam	3·3	+1·9	13·4
	Berhampore *	8·2	+2·2	11·1		Aduthurai *	4·5	+3·3	8·4
	Calingapatam	0·0	0·0	0·0		Madura	2·4	+1·1	5·7
	Vizagapatam	3·1	−1·8	3·9		Pamban	0·0	−0·1	10 5
	Anakapalli *	1·3	−1·8	2 2		Koilpatti *	0·0	0·0	0·0
	Samalkota *	1 9	−2·2	5·7		Palamkottah	0·0	−0·6	8·3
	Maruteru *	1·3	−2 5	1 5					
	Cocanada	0·8	−4·0	2·1					
	Masulipatam	1·7	−2·8	3·7	West	Trivandrum	4·3	−9·0	16·6
	Guntur *	7·3	+4·0	8 5	Coast	Cochin	22·9	−5·6	28·7
						Calicut	23·3	−10·8	27·1
Ceded	Kurnool	4·8	+1·9	5·9		Pattambi *	11·7	−14·4	15·1
Dists.	Nandyal *	0 0	0·0	0·0		Taliparamba *	29·3	−9·9	34·9
	Hagari *	5·0	+3·3	6·8		Kasargode *	48·9	+11·3	54·0
	Bellary	4·1	+2·3	5·0		Nileshwar *	37·8	−11·9	40·7
	Anantapur	3·0	0·0	5·0		Mangalore	32·1	−4·7	33·5
	Cuddapah	6·0	+3·1	6·8					
Carnatic	Nellore	0·6	−0·7	1·9	Mysore	Chitaldrug	7·0	+4·1	9·7
	Madras	1·2	0·7	1·8	and	Bangalore	6·7	+3·8	10·3
	Palur *	0·	−1·9	4·6	Coorg	Mysore	3·9	+0·9	13 6
	Palakuppam *	0·1	−2·4	3·5		Mercara	14·8	−11·6	21·1
	Cuddalore	1·1	−0·5	4·5					
Central	Vellore	2·1	−0·3	4·3	Hills.	Kodaikanal	7·0	+2·9	22·2
	Hosur cattle farm *	0·0	0·0	0·0		Coonoor	1·1		18·9
						Ootacamund *	3·3	−4·4	10·7
	Salem	3·7	+0·7	6·9		Nanjanad *	6·5	−1·6	17·0
	Coimbatore	0 5	−1·1	3·8					
	Coimbatore Res. Inst. *	0·3	−1·0	4·5					
	Trichinopoly	3 2	+1·8	11·7					

*Meteorological Stations of the Agricultural Department.

Summary of weather conditions. The Bay monsoon which remained fairly active since the middle of last month strengthened after the 10th June and caused widespread rain in Burma and Assam. A feeble advance of the Arabian Sea branch of the monsoon occurred on the 6th and the monsoon current remained shallow till the 14th when it strengthened. A depression formed in the East Arabian Sea on the 17th, which further strengthened the monsoon along the West Coast and caused its extension into the Deccan. For the rest of the month the monsoon remained fairly strong and caused nearly general rain in Konkan and the Deccan.

Rainfall was above normal in Ceded districts and Mysore and locally in the Circars and West Coast and in the South. Chief falls reported were :-

Cranganore (Cochin).	8·3″	on the 10th.
Irinjalakuda ,,	5 7″	,, 10th.
Alwaye (Travancore)	5 9″	,, 10th.
Calicut.	4·4″	,, 16th.
Mahabaleswar.	4·5″	,, 18th.
Calingapatam.	7·4″	,, 26th.
Taliparamba.	5·6″	
Kasaragod.	7·6″	
Hagari.	4·3″	on the 10th.

Maximum temperatures were above normal for the first ten days of the month after which the temperatures were generally normal. The highest temperature recorded was 116°F. at Cocanada on the 3rd June.

Weather Report No. 6/55 of the Research Institute Observatory.

Absolute Maximum in shade.	...	...	98·8°F.
Absolute Minimum in shade.	...	...	70·4°F.
Mean maximum in shade.	...	...	93·4°F.
Departure from normal.	...	...	+4·2°F.
Mean minimum in shade.	...	...	73·7°F.
Departure from normal.	...	...	+0·6°F.
Total rainfall.	...	...	0·32″
Departure from normal.	...	...	−1·02″
Heaviest fall in 24 hours.	...	...	0·20″
Total number of rainy days.	...	...	1
Mean daily wind velocity.	...	...	5·8 m. p. h.
Mean humidity at 8 hours.	...	...	63·8%
Departure from normal.	...	...	5·5%
Total hours of bright sunshine	...	...	198·7
Mean daily hours of bright sunshine.		...	6·6

Summary. Rainfall was in large defect. The monsoon did not appear till about the middle of the month. Day temperatures were in large excess while night temperatures were nearly normal. A. S. R. & A. S.

Departmental Notifications.

Promotions.

M. R. Ry. C. Venkateswaravayya, Assistant, Paddy Section (V Grade, Rs. 85–5–120) is promoted to IV Grade Rs. 120–10–170 with effect from 1st April 1935.

Leave.

M.R.Ry. Sitarama Ayyar, Demonstrator, Perambalur, V circle. L. A. P. for 3 months in continuation of leave already granted.

M.R.Ry. K. Krishnan, F. M. Taliparamba, VII circle, extention of leave on M. C. for two months from 8–6–1936.

Transfers.

M. R. Ry. C. S. Gopalaswamy Rao, Mycology Assistant, II Circle, Guntur, is transferred to I Circle—to report himself for duty to the Deputy Director of Agriculture, I Circle, Vizagapatam. The transfer will take effect from about the last week of June 1935.

2. M. R Ry. P. S. Krishnamurthi, Entomology Assistant, II Circle, who is undergoing mycological training at Coimbatore will rejoin duty at Guntur by about the end of July 1935. Till then, Mr. C. S. Gopalaswamy Rao, from I Circle, will be in charge of the work in the II Circle also.

Consequent on the appointment of Mr. M. Suryanarayana as Assistant Agricultural Chemist, M. R. Ry. K. Saptharishi, temporary Assistant in Botany, Madras Pempheres and Physiological Scheme to be temporary Assistant in Chemistry in the same scheme.

(i) M. R. Ry. P. Kannan Nambiyar, Assistant Farm Manager on the expiry of his leave to Erode.

(ii) On relief by No. (i), M. R. Ry. K. C. Thomas will proceed to Kodumudi and assist M. R. Ry. M. Chinnaswamy Nayudu in the irrigation experiments.

M. R Ry. V. S. Narayanaswami Ayyar, Avl , Headmaster, Agricultural School, Usilampatti on return from leave on 24th August 1935 is posted to V circle.